

Human Body Systems Curriculum

This curricula and accompanying instructional materials have been developed to align with the NJSLS and in accordance with the NJ Department of Education's guidelines to include: Curriculum designed to meet grade level expectations, integrated accommodations and modifications for students with IEPs, 504s, ELLs, and gifted and talented students, assessments including benchmarks, formative, summative, and alternative assessments, a list of core instructional and supplemental materials, pacing guide, interdisciplinary connections, integration of 21st century skills, integration of technology, and integration of 21st Century Life and Career standards.

About the Standards

In 1996, the New Jersey State Board of Education adopted the state's first set of academic standards called the Core Curriculum Content Standards. The standards described what students should know and be able to do upon completion of a thirteen-year public school education. Over the last twenty years, New Jersey's academic standards have laid the foundation for local district curricula that is used by teachers in their daily lesson plans.

Revised every five years, the standards provide local school districts with clear and specific benchmarks for student achievement in nine content areas. Developed and reviewed by panels of teachers, administrators, parents, students, and representatives from higher education, business, and the community, the standards are influenced by national standards, research-based practice, and student needs. The standards define a "Thorough and Efficient Education" as guaranteed in 1875 by the New Jersey Constitution. Currently the standards are designed to prepare our students for college and careers by emphasizing high-level skills needed for tomorrow's world.

The New Jersey Student Learning Standards include Preschool Teaching and Learning Standards, as well as nine K-12 standards for the following content areas: **21st Century Life and Careers, Comprehensive Health and Physical Education, English Language Arts, Mathematics, Science, Social Studies, Technology, Visual and Performing Arts, World Languages**

Lower Cape May Regional School District Human Body Systems Curriculum	
Content Area: Science	
Course Title: Human Body Systems	Grade level: 10-12
Unit 1: Identity	Dates for Units: September
Unit 2: Communication	Dates for Units: Oct- Nov
Unit 3: Power	Dates for Units: Dec- Jan
Unit 4: Movement	Dates for Units: Feb- March
Unit 5: Protection	Dates for Units: April
Unit 6: Homeostasis	Dates for Units: May
Unit 7: The Reproductive System	Dates for Units: May-June
Date Created: As adopted from PLTW 2018	Board Approved On:

Lower Cape May Regional School District Human Body Systems Curriculum Unit 1 Overview
Content Area: Science

Unit Title: Identity**Target Course/Grade Level: Grades 10-12****Unit Summary:**

The goal of Unit 1 is to engage students in a discussion of what it means to be human. Students investigate the body systems and functions that all humans have in common and then look at differences in tissues, such as bone and muscle, and in molecules, such as DNA, to pinpoint unique identity.

Students play the role of forensic anthropologists as they unlock the clues of identity found in bone and use restriction analysis and gel electrophoresis to analyze differences in DNA. Students begin to study histology and build upon their knowledge of human tissue.

In the HBS course, students will be working with an Anatomy in Clay™ two foot skeletal model. Students will work in pairs on an assigned Maniken® model and will use clay to build various organs, tissues, and vessels on the skeletal frame. Over the year each Maniken model will take on a unique identity. Even though students are technically building the same structures on their model, students will notice that the Manikens do not all look the same. Faces will look different. Muscles may be more defined. Blood vessel placement may vary slightly. The Maniken may manifest a disease or illness. The core remains the same, but the specific details will lead to the individual.

Identity Lesson Summary

Lesson 1.1 Identity – Human

Lesson 1.2 Identity – Tissues

Lesson 1.3 Identity – Molecules and Cells

Interdisciplinary Connections:**R.1 - Reading**

Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

R.2 - Reading

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

W.1 - Writing

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

AS.W.5 - Writing

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

AS.W.6 - Writing

Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

21st Century Themes, Skills, and Standards:

- 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as

structured learning experiences, apprenticeships, and dual enrollment programs.

- 9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.
- 9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
- 9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.
- 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
HS-LS1-2	Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
HS-LS1-1	All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells
HS-LS1-3	Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.
HS-LS1-4, HS-LS1-5, HS-LS1-7	Use a model based on evidence to illustrate the relationships between systems or between components of a system
HS-LS1-3	Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.
HS-LS1-1	Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that

	<p>describe the natural world operate today as they did in the past and will continue to do so in the future.</p>
<p>Unit Enduring Questions:</p> <ul style="list-style-type: none"> ● What is homeostasis? ● How is the human body alike and different depending on individuals? ● What are various careers in biomedical sciences? ● How can making a Maniken model out of clay assist us in understanding the body? ● What role does DNA play in human identity? ● What are molecular techniques used to determine identity? 	<p>Unit Enduring Understandings:</p> <ul style="list-style-type: none"> ● The basic processes of the body unite us as humans, but tiny differences in our appearance, our tissues, and our cells make us truly unique. ● differences influence our physical appearance, our personality, our ability to deal with external stressors and our overall health and susceptibility to disease ● Students will know about all four tissue types ● Students will examine the role that cells and molecules such as DNA and proteins play in human identity
<p>Unit Objectives: <i>Students will know....</i></p> <ul style="list-style-type: none"> ● Important concepts about systems that were presented in Principles of Biomedical Science (PBS) ● the classification of human tissue. ● how scientists design equations ● basic information about all four tissue types and use this information to create a graphic organizer ● the basic processes that unite us as humans ● various careers in Biomedical sciences 	<p>Unit Objectives: <i>Students will be able to.....</i></p> <ul style="list-style-type: none"> ● use a microscope to view some of the tissue types that contribute to identity, and they will begin to compare the structure and function of these tissues. ● play the role of forensic anthropologists to examine skeletal remains ● use theoretical equations to predict their own height from the length of their bones ● document their experiences in a career journal ● take bone measurements and analyze findings to determine a person’s race, gender, age, and height ● apply their knowledge about cells/molecules/DNA to identify a fictitious person ● apply their knowledge about cells/molecules/DNA to design a biometrics plan for a particular client

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**Lower Cape May Regional School District Human Body Systems Curriculum
Unit 2 Overview**

Content Area: Science

Unit Title: Communication

Target Course/Grade Level: Grades 10-12

Unit Summary:

The goal of Unit 2 is for students to investigate modes of communication within the human body as well as the ways the human body communicates with the outside world. Students map the function of key regions of the brain and explore how the body detects, processes, and responds to internal and external stimuli. Students investigate the roles of electrical and chemical signals in communication and response in the human body. They explore the ways in which hormones and the endocrine system control body function in order to solve a medical mystery.

Students compare response time to reflex and voluntary actions using data acquisition software, and they design experiments to test factors that can impact this response. By investigating the anatomy and physiology of the human eye, students learn how the body receives and interprets stimuli from the outside world.

Communication Lesson Summary

Lesson 2.1 The Brain

Lesson 2.2 Electrical Communication

Lesson 2.3 Chemical Communication

Lesson 2.4 Communication with the Outside World

Interdisciplinary Connections:

R.1 - Reading

Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

R.2 - Reading

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

W.1 - Writing

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

AS.W.5 - Writing

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

AS.W.6 - Writing

Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others

F.IF.4 - Interpreting Functions

For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

S.ID.6 - Interpreting Categorical and Quantitative Data

Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

21st Century Themes, Skills, and Standards:

- 9.2.12.CAP.7: Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.
- 9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.
- 9.2.12.CAP.9: Locate information on working papers, what is required to obtain them, and who must sign them.
- 9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans).

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
HS.LS1.2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-2	Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
HS-LS1-1	All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells
HS-LS1-3	Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.
HS-LS1-4, HS-LS1-5, HS-LS1-7	Use a model based on evidence to illustrate the relationships between systems or between components of a system
HS-LS1-3	Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.
HS-LS1-1	Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
<p>Unit Enduring Questions:</p> <ul style="list-style-type: none"> • How does the brain coordinate communication around the body and integrate the function of many systems to assure the body's continued homeostasis? • How are neurons able to send messages and control body functions? • How do hormones regulate body functions? • How does the body process signals from the outside world, particularly visual stimuli? 	<p>Unit Enduring Understandings:</p> <ul style="list-style-type: none"> • the motor cortex and language centers in the brain send and receive electrical signals and electricity is generated and propagated through human systems • Through electrical and chemical signals neurons are able to control body functions • Students will understand the many glands and hormones of the endocrine system • Students will understand hormone pathways • The structure of the eye

<p>Unit Objectives: <i>Students will know....</i></p> <ul style="list-style-type: none"> • the specific functions of each region of the brain by creating a detailed map of both structure and function and by completing an optional sheep brain dissection • The role that chemicals, specifically neurotransmitters, play in the movement of electrical signals. • Response time for both reflex and voluntary actions will be assessed using data acquisition software. • The difference between chemical communication and electrical communication 	<p>Unit Objectives: <i>Students will be able to.....</i></p> <ul style="list-style-type: none"> • build the central nervous system on a skeletal model. • create models of neurons and use interactive websites to visualize how an electrical impulse can be generated from the movement of ions in a membrane. • investigate what happens when electrical communication breaks down • Play the role of neurologists- analyze case information, provide a diagnosis, demonstrate the breakdown in communication, and present their findings to their peers. • Show glands, hormones, and targets on an endocrine system graphic organizer • Describe the tests and procedures that go into a routine eye exam and compare three different career paths in the field of vision

<p>Lower Cape May Regional School District Human Body Systems Curriculum Unit 3 Overview</p>
<p>Content Area: Science</p>
<p>Unit Title: Power</p>
<p>Target Course/Grade Level: 10-12</p>
<p>Unit Summary: Unit 3: Power</p>

The goal of Unit 3 is for students to investigate the human body systems that work to obtain, distribute, or process the body's primary resources for energy and power—food, oxygen, and water. Students make a model of the digestive system and design experiments to test the optimal conditions for enzymatic digestion. They explore lung function by diagnosing and treating a patient with breathing problems and use probes and data acquisition software to monitor their own lung function. Students investigate the anatomy and physiology of the urinary system and run simulated urinalysis to identify health conditions and diagnose disease.

Power Lesson Summary

Lesson 3.1 Introduction to Power (Optional)

Lesson 3.2 Food

Lesson 3.3 Oxygen

Lesson 3.4 Water

Interdisciplinary Connections:

R.1 - Reading

Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

R.2 - Reading

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

W.1 - Writing

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

AS.W.5 - Writing

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

AS.W.6 - Writing

Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others

21st Century Themes, Skills, and Standards:

- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12.prof.CR3a).
- 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12.prof.CR2b, 2.2.12.LF.8).
- 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

Learning Targets	
CPI #	Cumulative Progress Indicators (CPI) for Unit
HS.LS1.7	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
HS-LS1-2	Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
HS-LS1-1	All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells
HS-LS1-3	Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.
HS-LS1-4, HS-LS1-5, HS-LS1-7	Use a model based on evidence to illustrate the relationships between systems or between components of a system
HS-LS1-3	Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.
HS-LS1-1	Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
Unit Enduring Questions: <ul style="list-style-type: none"> • How do the human body systems work to obtain, distribute, or process the body's 	Unit Enduring Understandings: <ul style="list-style-type: none"> • Students will understand diet and how it affects metabolism • Students will understand how macromolecules

<p>primary resources for energy and power— food, oxygen, and water.</p> <ul style="list-style-type: none"> ● How does the human body survive extreme environments? ● How does the body deal with food and fuel shortage? 	<p>are processed from food to energy potential</p> <ul style="list-style-type: none"> ● Students will understand glucose/ATP production ● Changes in the respiratory system that can lead to asthma
<p>Unit Objectives: <i>Students will know....</i></p> <ul style="list-style-type: none"> ● About the resources that fuel life as well as debate how long the body can last when these resources become scarce ● How to relate the macromolecules that are processed from food to energy potential ● How to investigate respiratory system anatomy ● How to analyze how disease impacts function in the respiratory system and other systems ● The many functions of water in the human body 	<p>Unit Objectives: <i>Students will be able to.....</i></p> <ul style="list-style-type: none"> ● Study the body systems that help create, process, or distribute each of the body’s three main resources- food, oxygen, and water. ● Explore the structure of ATP and examine how this energy source is used to fuel all of the cellular processes in the body ● Analyze prescription medications and begin to think about how drugs work in the human body ● Play the role of a respiratory therapist (to design a plan to help their patient manage her illness)

**Lower Cape May Regional School District Human Body Systems Curriculum
Unit 4 Overview****Content Area: Science****Unit Title: Movement****Target Course/Grade Level: Grades 10-12****Unit Summary:****Unit 4: Movement**

In Unit 4 students investigate movement of the human body as well as the movement of substances within the body. By building muscle groups on a skeletal model, students learn how a muscle's structure is directly related to its function and to the actions it can produce. Students design experiments to test the requirements for muscle contraction and create models to show relaxation and contraction of the sarcomere. A study of blood flow illustrates the roles that smooth and cardiac muscles play in the transport of substances around the body. At the end of the unit, students combine information about power and movement to describe how the body fuels and responds to exercise. Playing the role of biomedical professionals in a combined medical practice that caters to athletes, students design a comprehensive training plan for an athlete. The plan includes all aspects of training, from diet and exercise to hydration and injury prevention.

Movement Lesson Summary

Lesson 4.1 Joints and Motion

Lesson 4.2 Muscles

Lesson 4.3 Blood Flow

Lesson 4.4 Energy and Motion – Exercise Physiology

Interdisciplinary Connections:

R.1 - Reading

Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

R.2 - Reading

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

W.1 - Writing
 Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
 AS.W.5 - Writing
 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
 AS.W.6 - Writing
 Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others

21st Century Themes, Skills, and Standards:

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
HS.LS1.2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
HS-LS1-2	Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
HS-LS1-1	All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells
HS-LS1-3	Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.
HS-LS1-4, HS-LS1-5, HS-LS1-7	Use a model based on evidence to illustrate the relationships between systems or between components of a system
HS-LS1-3	Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.

<p>HS-LS1-1</p>	<p>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</p>
<p>HS.ETS1.2</p>	<p>Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering</p>
<p>HS.ETS1.3</p>	<p>Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.</p>
<p>Unit Enduring Questions:</p> <ul style="list-style-type: none"> ● How does the skeletal system work? ● How do muscles work? ● How does blood flow through the body and to what purposes? ● How do energy and motion factor into exercise physiology? ● How is training, diet, exercise, and hydration key to injury prevention? 	<p>Unit Enduring Understandings:</p> <ul style="list-style-type: none"> ● Although our skeleton is rigid and offers protection and support, joints allow for flexibility and range of motion. ● Different muscle tissues have key difference in structure and function ● Arteries and veins have different structural differences ● Power and movement vs. body fuel and exercise
<p>Unit Objectives: <i>Students will know....</i></p> <ul style="list-style-type: none"> ● How the skeletal system works ● How to interpret schematic diagrams ● How to design a method to measure the angle of specific movements ● About the anatomy and physiology of the heart 	<p>Unit Objectives: <i>Students will be able to.....</i></p> <ul style="list-style-type: none"> ● Identify synovial joints ● Dissect and manipulate a cow elbow ● Use a device called a goniometer to measure the range of motion of their own joints ● Study pressure in blood vessels ● Measure and calculate the ABI (Ankle Brachial Index) of a patient

	<ul style="list-style-type: none"> ● Interpret schematic diagrams ● Design a method to measure the angle of specific movements
<p>Lower Cape May Regional School District Human Body Systems Curriculum Unit 5 Overview</p>	
<p>Content Area: Science</p>	
<p>Unit Title: Protection</p>	
<p>Target Course/Grade Level: Grades 10-12</p>	
<p>Unit Summary:</p> <p>Unit 5: Protection In this unit students explore ways in which the human body protects itself from injury and disease. Before students investigate specific defense mechanisms and the immune system, they explore the protective functions of skin, bone, and the feeling of pain. Antigen-antibody interactions are introduced as well as the structure of the lymphatic and immune system. Students analyze data from a fictional illness and relate antibody response to the action of specific white blood cells.</p> <p>Protection Lesson Summary Lesson 5.1 The Skin Lesson 5.2 Bones Lesson 5.3 Lymph and Blood Cells</p>	
<p>Interdisciplinary Connections:</p> <p>R.1 - Reading Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.</p> <p>R.2 - Reading Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.</p> <p>W.1 - Writing Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.</p> <p>AS.W.5 - Writing</p>	

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
 AS.W.6 - Writing
 Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others

21st Century Themes, Skills, and Standards:

- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
- 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
- 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
HS.LS1.2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
HS-LS1-2	Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
HS-LS1-1	All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells
HS-LS1-3	Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.
HS-LS1-4, HS-LS1-5, HS-LS1-7	Use a model based on evidence to illustrate the relationships between systems or between components of a system

<p>HS-LS1-3</p>	<p>Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</p>
<p>HS.LS1.3</p>	<p>Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.</p>
<p>Unit Enduring Questions:</p> <ul style="list-style-type: none"> ● How does the human body protect itself from injury and disease? ● How does the immune system work? ● What is an antibody response and what do white blood cells do? ● What role do antigens and antibodies play? ● Why is calcium in blood important to bones? 	<p>Unit Enduring Understandings:</p> <ul style="list-style-type: none"> ● Each layer of skin has a different composition and function ● Bones are structured to protect internal organs ● Bones heal themselves ● Immune cells protect the body ● Healthy bone maintenance can prevent breakage
<p>Unit Objectives: <i>Students will know....</i></p> <ul style="list-style-type: none"> ● There are various layers of tissues that serve different functions ● Skin and bones protect organs ● Bones heal themselves ● Immune cells protect the body ● What happens when pathogens invade the body 	<p>Unit Objectives: <i>Students will be able to.....</i></p> <ul style="list-style-type: none"> ● Understand bone structure and write about it ● Understand the different layers of skin and their function. ● Investigate careers related to care and rehabilitation after a burn ● Understand the role of immune cells, antibodies, and antigens and graph data depicting levels during various stages of illness ● Understand the connection between all body systems

Content Area: Science

Unit Title: Homeostasis/ Health and Wellness

Target Course/Grade Level: Grades 10-12

Unit Summary:

Unit 6: Homeostasis

This unit focuses on the connection between all of the human body systems and examines how these systems work together to maintain health and homeostasis. Students explore how the body deals with extreme external environments as well as how the body reacts to and defends against injury and illness. Students begin to discuss and design medical interventions for a fictional case study. The activities in this lesson are an engagement for the subsequent course, entitled Medical Interventions (MI).

Health and Wellness

The goal of this lesson is for students to examine how the systems of the body work together to maintain health and homeostasis. Students will reflect on the way in which the body systems work together to provide identity, facilitate communication inside and outside of the body, power movement of substance around the body and of the body as a whole, and protect the body from harm. They will compile information from the graphic organizers they have created all year into organizers that are broken down by function. In this lesson students will have the chance to explore a disease and design a case study for a fictional patient. By building the case from start to finish, they will learn how a disease presents in the body, how it is diagnosed, and how the illness or injury is treated.

Students are responsible for showcasing input from various biomedical professionals as well as for showing the physical manifestation of the disease and demonstrating an effective medical intervention on their Maniken® model.

Interdisciplinary Connections:

R.1 - Reading

Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

R.2 - Reading

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

W.1 - Writing

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

AS.W.5 - Writing

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

AS.W.6 - Writing

Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others

21st Century Themes, Skills, and Standards:

9.4.12.DC.7: Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society (e.g., 6.1.12.CivicsPD.16.a).

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
HS.LS1.2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
HS.LS1.3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
HS.ETS1.2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
HS.ETS1.3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Unit Enduring Questions:

- What is homeostasis?
- How are human body systems interrelated?
- How does the body react and defend against injury and illness?
- Doctors must consider a variety of factors before designing medical interventions for patients

Unit Enduring Understandings:

- Human body systems are connected to maintain health and homeostasis
- Understand how does the human body deal with extreme external environments
- Understand how do doctors design medical interventions for patients

<p>Unit Objectives: <i>Students will know....</i></p> <ul style="list-style-type: none"> ● How to use data to make predictions about health ● About the various stages of illness ● How the immune system protects and fights against disease ● What is homeostasis and why is it important 	<p>Unit Objectives: <i>Students will be able to.....</i></p> <ul style="list-style-type: none"> ● Design medical interventions for a fictional case study ● Explore how the body deals with extreme external environments ● Use an apply knowledge from this course to write about fictional case studies
<p>Lower Cape May Regional School District Human Body Systems Curriculum Unit 7 Overview</p>	
<p>Content Area: Science</p>	
<p>Unit Title: The Reproductive System (*Additional coursework for Articulation agreement students)</p>	
<p>Target Course/Grade Level: Grades 10-12</p>	
<p>Unit Summary:</p> <p>Unit 6: the Reproductive System This final unit focuses on the human reproductive system. Students will learn to identify various organs and systems and be able to explain their functions. Students will learn the reproductive process as well as possible complications with the reproductive system.</p>	
<p>Interdisciplinary Connections:</p> <p>R.1 - Reading Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.</p> <p>R.2 - Reading Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.</p> <p>W.1 - Writing Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.</p> <p>AS.W.5 - Writing</p>	

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
 AS.W.6 - Writing
 Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others

21st Century Themes, Skills, and Standards:

- 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.
- 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8) •
- 9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4)

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
HS-LS3-2	In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited.
HS-LS3-2, HS-LS3-3	Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors
HS-LS1-3	Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.
HS-LS1-4, HS-LS1-5, HS-LS1-7	Use a model based on evidence to illustrate the relationships between systems or between components of a system

<p>HS-LS1-3</p>	<p>Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</p>
<p>HS-LS1-1</p>	<p>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</p>
<p>Unit Enduring Questions:</p> <p>What are key components of the reproductive system?</p> <p>What is the function of various structures used in reproduction?</p> <p>What are common reproductive system problems?</p>	<p>Unit Enduring Understandings:</p> <p>Students will understand how to locate and identify the structures of the female and male reproductive systems using models, diagrams, or images. They will be able to define the function of these structures.</p>
<p>Unit Objectives: <i>Students will know....</i></p> <ul style="list-style-type: none"> • When provided with an appropriate model or diagram, how to identify the organs of the female reproductive system, and discuss the general function of each. • How to describe the functions of the vesicular follicle and corpus luteum of the ovary. • How to define endometrium, myometrium, and ovulation. • How to indicate the location of the following regions of the female uterus: cervix, fundus, and body. • How to define oogenesis. • How to describe the influence of FSH and LH on ovarian function. • How to describe the phases and 	<p>Unit Objectives: <i>Students will be able to.....</i></p> <ul style="list-style-type: none"> • Discuss the common purpose of the reproductive system organs. • When provided with a model or diagram, identify the organs of the male reproductive system, and discuss the general function of each. • Name the endocrine and exocrine products of the testes. • Discuss the composition of semen, and name the glands that produce it. • Trace the pathway followed by a sperm from the testis to the body exterior. • Define erection, ejaculation, and circumcision. • Define spermatogenesis and meiosis. • Describe the structure of a sperm, and relate its structure to its function.

<p>controls of the menstrual cycle.</p> <ul style="list-style-type: none"> • How to describe the structure and function of the mammary glands. 	<ul style="list-style-type: none"> • Describe the effect of FSH and LH on testis functioning. • Define fertilization and zygote. • Describe implantation. • Distinguish between an embryo and a fetus. • List the major functions of the placenta. • Indicate several ways that pregnancy alters or modifies the functioning of the mother's body. • List several agents that can interfere with normal fetal development. • Describe how labor is initiated, and briefly discuss the three stages of labor. • Describe the importance of the presence/absence of testosterone during embryonic development of the reproductive system organs. • Define menarche and menopause. • List common reproductive system problems seen in adult and aging men and women.
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**Lower Cape May Regional School District Human Body Systems Curriculum
Evidence of Learning**

Specific Formative Assessments Utilized in Daily Lessons:

- Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.
- Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

Summative Assessment Utilized throughout Units:

- Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.
- Write informative/explanatory texts to examine and convey complex ideas and information

- clearly and accurately through the effective selection, organization, and analysis of content.
- Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

Modifications for ELL's, Special Education, 504, and Gifted and Talented Students:

- Teacher tutoring
- Peer tutoring
- Cooperative Learning Groups
- Modified Assignments
- Differentiated Instruction
- Response to Intervention (www.help4teachers.com)
- Follow all IEP and 504 modifications
- ADD TO LIST AS YOU SEE NECESSARY

Teacher Notes:

- As required by the NJ Department of Education, teachers in all content areas will integrate the 21st Century Life and Careers Standards. As the NJDOE indicates, "Providing New Jersey students with the life and career skills needed to function optimally within this dynamic context is a critical focus and organizing principle of K-12 public education. New Jersey has both an obligation to prepare its young people to thrive in this environment, and a vested economic interest in grooming an engaged citizenry made up of productive members of a global workforce that rewards innovation, creativity, and adaptation to change." The links below indicate the CPIs for grade ranges and need to be addressed throughout the units of study:
[Life and Career Standards](#)
- As indicated in the NJSLS, standards and interdisciplinary connections will be integrated throughout content area curriculum.

Project-based Learning Tasks:

- Asper PLTW web-based site

Vocabulary:

- In-text vocabulary should be incorporated into every unit. Word journals, vocabulary walls, and/or various other activities should be utilized by the instructor to teach vocabulary.

The Research Process:

- The research process must be integrated within each course curriculum. Student will be provided with opportunities to investigate issues from thematic units of study. As the NJSLS indicate, students will develop proficiency with MLA or APA format as applicable.

Technology:

- Students must engage in technology applications integrated throughout the curriculum.
- PLTW website with interactive videos and assignments

Resources:

Ancillary resources and materials used to deliver instruction are included below:

- Anatomy in Clay Maniken
- Logger Pro 3
- Vernier Sensors
- Dissection Materials: Brain, Eye, Lungs, Synovial Joints
- 3 D Molecular Design Models
- Inspiration and Lucid Chart Concept Mapping Platforms
- Ultrasound Machines
- Pasco Eye Models
- Surviving the Extremes (Autobiography by Kenneth Kamler)

Differentiation Strategies

Differentiation strategies can require varied amounts of preparation time. High-prep strategies often require a teacher to both create multiple pathways to process information/demonstrate learning and to assign students to those pathways. Hence, more ongoing monitoring and assessment is often required. In contrast, low-prep strategies might require a teacher to strategically create process and product choices for students, but students are allowed to choose which option to pursue given their learning profile or readiness level. Also, a low-prep strategy might be focused on a discrete skill (such as vocabulary words), so there are fewer details to consider. Most teachers find that integration of one to two new low-prep strategies and one high-prep strategy each quarter is a reasonable goal.

Low Prep Strategies (add to list as needed)

Varied journal prompts, spelling or vocabulary lists

Students are given a choice of different journal prompts, spelling lists or vocabulary lists depending on level of proficiency/assessment results.

Anchor activities

Anchor activities provide meaningful options for students when they

	are not actively engaged in classroom activities (e.g., when they finish early, are waiting for further directions, are stumped, first enter class, or when the teacher is working with other students). Anchors should be directly related to the current learning goals.
Choices of books	Different textbooks or novels (often at different levels) that students are allowed to choose from for content study or for literature circles.
Choices of review activities	Different review or extension activities are made available to students during a specific section of the class (such as at the beginning or end of the period).
Homework options	Students are provided with choices about the assignments they complete as homework. Or, students are directed to specific homework based on student needs.
Student-teacher goal setting	The teacher and student work together to develop individual learning goals for the student.
Flexible grouping	Students might be instructed as a whole group, in small groups of various permutations (homogeneous or heterogeneous by skill or interest), in pairs or individual. Any small groups or pairs change over time based on assessment data.
Varied computer programs	The computer is used as an additional center in the classroom, and students are directed to specific websites or software that allows them to work on skills at their level.
Multiple Intelligence or Learning Style options	Students select activities or are assigned an activity that is designed for learning a specific area of content through their strong intelligence (verbal-linguistic, interpersonal, musical, etc.)
Varying scaffolding of same organizer	Provide graphic organizers that require students to complete various amounts of information. Some will be more filled out (by the teacher) than others.
Think-Pair-Share by readiness, interest, and/or learning profile	Students are placed in predetermined pairs, asked to think about a question for a specific amount of time, then are asked to share their answers first with their partner and then with the whole group.
Mini workshops to re-teach or extend skills	A short, specific lesson with a student or group of students that focuses on one area of interest or reinforcement of a specific skill.
Orbitals	Students conduct independent investigations generally lasting 3-6 weeks. The investigations “orbit” or revolve around some facet of

	the curriculum.
Games to practice mastery of information and skill	Use games as a way to review and reinforce concepts. Include questions and tasks that are on a variety of cognitive levels.
Multiple levels of questions	Teachers vary the sorts of questions posed to different students based on their ability to handle them. Varying questions is an excellent way to build the confidence (and motivation) of students who are reluctant to contribute to class discourse. Note: Most teachers would probably admit that without even thinking about it they tend to address particular types of questions to particular students. In some cases, such tendencies may need to be corrected. (For example, a teacher may be unknowingly addressing all of the more challenging questions to one student, thereby inhibiting other students' learning and fostering class resentment of that student.)
High Prep Strategies (add to list as needed)	
Cubing	Designed to help students think about a topic or idea from many different angles or perspectives. The tasks are placed on the six sides of a cube and use commands that help support thinking (justify, describe, evaluate, connect, etc.). The students complete the task on the side that ends face up, either independently or in homogenous groups.
Tiered assignment/ product	The content and objective are the same, but the process and/or the products that students must create to demonstrate mastery are varied according to the students' readiness level.
Independent studies	Students choose a topic of interest that they are curious about and wants to discover new information on. Research is done from questions developed by the student and/or teacher. The researcher produces a product to share learning with classmates.
4MAT	Teachers plan instruction for each of four learning preferences over the course of several days on a given topic. Some lessons focus on mastery, some on understanding, some on personal involvement, and some on synthesis. Each learner has a chance to approach the topic through preferred modes and to strengthen weaker areas
Jigsaw	Students are grouped based on their reading proficiency and each group is given an appropriate text on a specific aspect of a topic (the

	<p>economic, political and social impact of the Civil War, for example). Students later get into heterogeneous groups to share their findings with their peers, who have read about different areas of study from source texts on their own reading levels. The jigsaw technique allows you to tackle the same subject with all of your students while discreetly providing them the different tools they need to get there.</p>
Multiple texts	<p>The teacher obtains or creates a variety of texts at different reading levels to assign strategically to students.</p>
Alternative assessments	<p>After completing a learning experience via the same content or process, the student may have a choice of products to show what has been learned. This differentiation creates possibilities for students who excel in different modalities over others (verbal versus visual).</p>
Modified Assessments	<p>Assessments can be modified in a variety of ways – for example by formatting the document differently (e.g. more space between questions) or by using different types of questions (matching vs. open ended) or by asking only the truly essential questions.</p>
Learning contracts or Personal Agendas	<p>A contract is a negotiated agreement between teacher and student that may have a mix of requirements and choice based on skills and understandings considered important by the teacher. A personal agenda could be quite similar, as it would list the tasks the teacher wants each student to accomplish in a given day/lesson/unit. Both Learning contracts and personal agendas will likely vary between students within a classroom.</p>
Compacting	<p>This strategy begins with a student assessment to determine level of knowledge or skill already attained (i.e. pretest). Students who demonstrate proficiency before the unit even begins are given the opportunity to work at a higher level (either independently or in a group).</p>
Literature circles	<p>Flexible grouping of students who engage in different studies of a piece of literature. Groups can be heterogeneous and homogeneous.</p>
Learning Centers	<p>A station (or simply a collection of materials) that students might use independently to explore topics or practice skills. Centers allow individual or groups of students to work at their own pace. Students are constantly reassessed to determine which centers are appropriate for students at a particular time, and to plan activities at those centers to build the most pressing skills.</p>

**Tic-Tac-Toe Choice Board
(sometimes called “Think-Tac-Toe”)**

The tic-tac-toe choice board is a strategy that enables students to choose multiple tasks to practice a skill, or demonstrate and extend understanding of a process or concept. From the board, students choose (or teacher assigns) three adjacent or diagonal. To design a tic-tac-toe board: - Identify the outcomes and instructional focus - Design 9 different tasks - Use assessment data to determine student levels - Arrange the tasks on a tic-tac-toe board either randomly, in rows according to level of difficulty, or you may want to select one critical task to place in the center of the board for all students to complete.

Curriculum development Resources/Instructional Materials:

List or Link Ancillary Resources and Curriculum Materials Here:

- PLTW website

Board of Education Approved Text(s)

- PLTW website

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